

Assessing the Performance of the Malang Mbois Application through Functional and Integration Testing

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Abstract

In the digital era, mobile applications like Malang Mbois—developed by the Communication and Informatics Office of Malang City—play a critical role in enhancing public services and community engagement. The issues related to the reliability and functionality of such applications necessitate rigorous evaluation. This research is essential as it seeks to highlight performance benchmarks for public service applications, ensuring they effectively meet user needs. The primary objective of this study is to evaluate the performance of the Malang Mbois application using functional and integration testing, guided by the black box testing method. The research focuses on assessing specific features of the application, aiming to identify any discrepancies against the established specifications. Methodologically, the study employs manual testing procedures directed at individual application features to ensure each meets functional requirements. The population for this research consists of the various features within the Malang Mbois application. The findings reveal that most features operate effectively, yielding an overall test success rate of 82.35%. However, certain bugs and integration issues were identified, specifically concerning the bookmark and search bar functionalities on particular pages. Despite demonstrating satisfactory performance in integrating external services, some components require further development. In conclusion, the results underscore the need for ongoing enhancements to improve the application's reliability and user experience. Future recommendations include extensive testing and further development to achieve complete functionality in the Malang Mbois application.

Keywords: Mobile Application, Functional Testing, Integration Testing, Software Development, Public Service

INTRODUCTION

In the rapidly evolving digital era, mobile applications have emerged as vital tools for enhancing public services and fostering community engagement. One such application is Malang Mbois, an Android-based platform developed by the Communication and Informatics Office (Kominfo) of Malang City. This application aims to provide citizens with comprehensive access to essential information, services, and facilities offered by the local government.

To ensure the reliability and performance of the Malang Mbois application, rigorous testing was executed using the black box method, which evaluates the application's functionality without inspecting its internal code. This method encompasses two primary components: functional testing and integration testing.

Functional testing is concerned with verifying that each feature of the application operates according to predefined specifications. This process entails assessing each function to confirm that it meets user requirements and operates correctly. On the other hand, integration testing assesses the interaction among the various components of the application, ensuring that they work seamlessly together. Identifying and addressing issues arising from component interactions is critical for maintaining smooth operation.

Functional and integration testing are indispensable in mobile app development, as they significantly enhance software quality and reduce long-term costs. Research

indicates that identifying functional bugs early through thorough testing can prevent expensive fixes later in the development cycle [1], [2]. Furthermore, integration testing ensures harmonious operation among different modules, which is crucial for overall functionality [1] [2] [3].

This study seeks to assess the performance of the Malang Mbois application through functional and integration testing. By identifying potential problems and areas for improvement, this research aims to enhance the overall functionality and user satisfaction of the application.

Despite existing studies on mobile application testing, there remains a gap regarding comprehensive evaluations of local government applications, particularly in their functional and integration capacities. This research addresses this gap, contributing to the understanding of mobile applications in public service delivery and their impact on community engagement.

The significance of this topic lies in its potential to improve public sector performance through technology. Given the increasing reliance on mobile applications for service delivery, it is crucial to ensure their effectiveness and reliability. Therefore, this study is vital to providing insights that can enhance the quality of public services through technology.

METHODS

This research employs a functional and integration testing approach to evaluate the performance of the Malang Mbois application, utilizing methods that have demonstrated effectiveness in previous studies. The testing is conducted manually through observation techniques, where each feature and function of the application is directly assessed by testers without the assistance of automation tools [4], [5]. This hands-on method provides testers with a comprehensive understanding of the application's performance in real-world conditions.

The research was conducted within the city of Malang, specifically focusing on the Malang Mbois application, which serves the local community. The study took place over a period of four weeks, allowing sufficient time for thorough testing of various application features. The primary focus of this research is the Malang Mbois application itself. The application is designed to facilitate access to information and services for citizens in Malang City. There were no additional respondents involved in this study, as the testing targeted the application's functionality. The evaluation criteria are based on the predefined specifications of the application's main features, which include usability, performance accuracy, and user satisfaction. The choice to focus on the Malang Mbois application is justified by its significance in enhancing public service delivery. By evaluating this application, the research aims to ensure its reliability and effectiveness in meeting user needs, which is essential for improving public engagement.

Functional testing is carried out using the black box testing approach, which evaluates the output of functions without considering internal structures or algorithms [6]. The testers create detailed test scenarios based on the application's functional requirements, providing specific inputs for each feature and then analyzing the resulting outputs. This method effectively identifies errors that may not surface during internal testing and confirms that the application aligns with user expectations [7]. Following functional testing, integration testing is performed to examine the interaction between application modules. This testing aims to verify that the modules can function cohesively when integrated [8], [9]. Within the context of black box testing, the focus lies on the interfaces between modules and the flow of data between them. The primary objective is to identify potential issues arising from module interactions, such as data incompatibility or erroneous information transmission. Thus, integration testing ensures that not only do individual modules perform adequately, but they also

collaborate effectively to deliver the anticipated outcomes for the application as a whole [10].

As outlined in Figure 1, the testing process for the Malang Mbois application comprises several key stages: Testing Planning, Test Case Identification, Test Implementation, and Reporting Test Results. Each stage is critical in ensuring a thorough evaluation of the application's performance.

The initial step in the process is Test Planning. During this stage, the objectives and scope of the testing are established. The specifications of the application's features are meticulously analyzed to highlight critical areas that require testing. This comprehensive planning aims to ensure that the tests address all significant aspects of the application and align with user requirements [11].

Following the planning phase, the Test Case Identification stage is conducted. In this step, relevant test scenarios are developed based on the specifications identified earlier. This approach utilizes the black box testing method, which emphasizes evaluating software outputs according to defined specifications. Such a methodology allows testers to assess functionality without needing to comprehend the internal code structure [12].

The Test Implementation stage involves executing the identified test cases manually through observation. The tester conducts hands-on testing of the Malang Mbois application, following the established scenarios to assess how the application performs in real-world conditions. This approach adheres to principles articulated by Yani in usability testing, ensuring that the evaluation is grounded in practical user experiences [13].

Upon completion of the test implementation, the next step is the Reporting Test Results phase. In this stage, the collected data is analyzed and documented, presenting findings from both functional and integration testing. This report includes identified issues, areas that require improvement, and recommendations for further application development. This systematic documentation approach is underscored by Anwar's research, which emphasizes the necessity for detailed reporting in software testing [14].

The entire testing process was carried out in a real-world environment, where the Malang Mbois application was installed on a device primarily used by its intended users. This manual observation technique follows the methodology suggested by Annisa and Nafisah in usability testing, enabling testers to experience user interaction directly and identify potential problems that automated tools might overlook [15]. The findings from this functional and integration testing will be further explored in the Results and Discussion section to provide a comprehensive overview of the Malang Mbois application's overall performance.

RESULTS AND DISCUSSION

This section presents a detailed discussion of the test results obtained from evaluating the "Malang Mbois" application using the Black Box testing method. The outcomes are organized into several main categories to provide a comprehensive understanding of how each feature and function of the application performed during the testing process. The testing methodologies employed consist of functional testing and integration testing, both of which are grounded in the black box approach. Functional testing focuses on verifying that each feature operates according to predefined specifications, while integration testing assesses the interaction between various components to ensure they work together seamlessly. As shown in Table 1, the results are categorized based on the application's core functionalities. Each feature was subjected to rigorous testing scenarios, and the outcomes reflect the application's ability to meet user requirements and perform effectively under real-world conditions. The success rates for each feature are reported alongside any identified issues,

providing insights into areas that require further attention and improvement. Table 1 summarizes the key findings, highlighting the features' performance metrics, including success rates, any bugs encountered, and the overall functionality during the testing phases. This structured approach to presenting test results allows for a clear identification of strengths and weaknesses within the application, serving as a foundation for subsequent recommendations aimed at enhancing the application's usability and reliability.

Table 1. Testing Results

1. No.	2. Page	3. Section	4. Features	5. Results (True/False)	6. Description	7. Testing Technique	
9.	1.	10. Main Index	11. Header	12. Search bar	13. True	14. FT	
			16. Menu Options	17. All	18. True	20. FT	
			21. Slider	22. -	23. True	25. FT	
			26. Survey	27. -	28. True	30. FT	
			31. Recommendation	32. -	33. True	35. FT	
			36. Video	37. See all	38. True	40. FT	
			41. Event	42. See all	43. True	45. FT	
			46. Announcement	47. See all	48. True	50. FT	
51.	2.	52. News	53. Index	54. Search bar	55. True	57. FT	
			58. News Slider	59. True	60. FT	61. FT	
			62. See All	63. Views	64. False	65. Not Real Time	66. FT
			67. Share	68. True	69. FT	70. FT	
			71. Bookmark	72. False	73. Not working	74. FT	
			75. Voice Reader	76. True	77. Cannot be paused	78. FT	
			79. News Details	80. Font Size Setting	81. True	82. FT	
			84. Share	85. True	86. FT	87. FT	
			88. Voice Reader	89. True	90. Cannot be paused	91. FT	
92.	3.	93. CCTV	94. Index	95. Search bar	96. False	97. Not working	98. FT
			99. Filter	100. False	101. Not working	102. FT	
103.	4.	104. Report	105. Report	106. Integration to Website	107. True	108. IT	
			110. Sambat Online	111. Create complaint ticket (Save button)	112. False	113. Not Refreshed	114. FT
			115. Ngombe	116. -	117. True	119. FT	
120.	5.	121. Ngalam 112	122. Integration to phone apps	123. -	124. True	125. IT	
127.	6.	128. Si-lzol	129. Index	130. Slider	131. True	132. FT	
			134. Application Submission	135. Verification code	136. True	137. FT	
			139. Application Revision	140. -	141. False	142. In development	143. FT
			144. Permit	145. -	146. False	147. Not	148. FT

1. No.	2. Page	3. Section	4. Features	5. Results (True/False)	6.	7. Description	8. Testing Technique
		Requirements				working	
		149. Permit Monitoring	150. Search for receipts	151. False		152. Not working	153. FT
		154. SKM Survey	155. -	156. False		157. Not working	158. FT
		159. About Izol	160. -	161. False		162. In Development	163. FT
164. 7.	165. Tax	166. e-SPPT	167. Search bar	168. True		169.	170. FT
		171. BPHTP	172. -	173. False		174. In development	175. FT
		176. e-SKPD	177. -	178. False		179. In Development	180. FT
181. 8.	182. Adminduk	183. Index	184. Search	185. False		186. Not working	187. FT
			188. Button WhatsApp (Customer Service)	189. True		190.	191. FT
			192. Application Check	193. True		194.	195. FT
			196. Electronic ID card	197. True		198.	199.
			200. Birth Certificate Package	201. True		202.	203.
			204. Child Identity Card	205. True		206.	207.
			208. Vulnerable /Disabled Population Services	209. True		210.	211.
212. 9.	213. Event	214. Index	215. Slider	216. True		217.	218. FT
			219. Search bar	220. False		221. Not working	222. FT
			223. Event Calendar	224. True		225.	226. FT
		227. See All	228. Search bar	229. False		230. Not working	231. FT
			232. Category button	233. True		234.	235. FT
241. 10.	242. Wifi	236. Event Details	237. -	238. True		239.	240. FT
		243. Index	244. Category	245. True		246.	247. FT
			248. Category (closest)	249. False		250. Not working	251. FT
252. 11.	253. Public Library	254. Integration Website	255. -	256. True		257.	258. IT
259. 12.	260. Health Center	261. index	262. Category button	263. True		264.	265. FT
		266. Detail of Health Center	267. Gmaps Address	268. True		269.	270. IT
			271. Mobile No.	272. True		273.	274. IT
			275. Website	276. True		277.	278. IT
			279. Social	280. True		281.	282. IT

1. No.	2. Page	3. Section	4. Features	5. Results (True/False)	7. Description	8. Testing Technique	
283. 13.	284. Education	285. Index	Media	286. Search bar	287. True	288.	289. FT
			290. Slider	291. True	292.	293. FT	
			294. Button website	295. True	296.	297. IT	
			298. PPDB info button	299. True	300.	301. IT	
			302. PPDB Website	303. True	304.	305. IT	
			306. See All	307. Category	308. True	309.	310. FT
				311. Search bar	312. True	313.	314. FT
			315. Education Details	316. Gmaps Address	317. True	318.	319. IT
				320. Mobile No.	321. True	322.	323. IT
				324. Website	325. True	326.	327. IT
328. 14.	329. City Mascot	330. Integration Website	to	331. -	332. True	333.	334. IT
335. 15.	336. Geoportal	337. Integration Website	to	338. -	339. True	340.	341. IT
342. 16.	343. MSME	344. My Class		345. -	346. True	347. Empty data	348. FT
		349. Class List		350. -	351. True	352. Empty Data	353. FT
354. 17.	355. MACITO	356. Index		357. My order	358. True	359.	360. FT
				361. View Schedule	362. True	363.	364. FT
				365. Book a ticket	366. True	367.	368. FT
			369. Ticket Reservation	370. Select a date	371. True	372.	373. FT
				374. Travel trip	375. True	376.	377. FT
				378. Select passenger type	379. True	380.	381. FT
				382. Continue ordering	383. True	384.	385. FT
			386. Book a Seat	387. Choose a chair	388. True	389.	390. FT
				391. Book a ticket	392. True	393.	394. FT
				395. My Order	396. -	397. True	398.
		400. Cancel order	401. True	402.	403. FT		
404. 18.	405. Sembarako	406. Index		407. Basic food chart	408. True	409.	410. FT
		411. Basic Food Chart		412. Show graphs by category	413. True	414.	415. FT
416. 19.	417. MCC	418. Integration Website	to	419. -	420. True	421.	422. IT
423. 20.	424. Travel	425. Index		426. Search bar	427. True	428.	429. FT
				430. Slider	431. True	432.	433. FT
			434. Travel details	435. Slider	436. True	437.	438. FT
				439. Button Gmaps	440. True	441.	442. IT
443. 21.	444. Uklam-Uklam	445. Index		446. Menu Button	447. True	448.	449. FT
				450. Slider	451. True	452.	453. FT
				454. See all	455. True	456.	457. FT
			458. Menu	459. Search Bar	460. True	461. Error on	462. FT

1. No.	2. Page	3. Section	4. Features	5. Results (True/False)	6.	7. Description	8. Testing Technique
		463. All menu details	464. Data	465. False		the shopping menu 466. Incomplete and Random	467. FT
		468. Hotel Details	469. Phone No. 473. Button Gmaps	470. True 474. True		471. 475.	472. IT 476. IT
		477. Souvenir Details	478. Button Gmaps	479. True		480.	481. IT
		482. Tour Details	483. Button Gmaps	484. False		485. Unconfigured	486. IT
		487. Rental Details	488. Button Gmaps	489. False		490. Unconfigured	491. IT
		492. Entertainment Details	493. Button Gmaps	494. False		495. Unconfigured	496. IT
		497. Shopping Details	498. Button Gmaps	499. False		500. Wrong location	501. IT
506. 22.	507. MPP	508. Integration Website	to 502. Phone No. 509. -	503. True 510. True		504. 511.	505. IT 512. IT
513. 23.	514. One Data	515. Integration Website	to 516. -	517. True		518.	519. IT
520. 24.	521. Simbah e	522. Index	523. Search bar	524. False		525. Not working	526. FT
			527. Sports facilities menu	528. True		529.	530. FT
			531. Basket	532. True		533.	534. FT
			535. Bill	536. True		537.	538. FT
		539. Sports Facilities Menu Details	540. Sports Facility Rental Button	541. True		542.	543. FT
544. 25.	545. JDIH	546. Integration Website	to 547. -	548. True		549.	550. IT
551. 26.	552. Job Fair	553. Integration Playstore	to 554. -	555. True		556.	557. IT
558. 26.	559. Drinking Water Service	560. Integration Website	to 561. -	562. True		563.	564. IT
565. 27.	566. OSS	567. Integration Website	to 568. -	569. True		570.	571. IT
572. 28.	573. Air Quality	574. Integration Website	to 575. -	576. True		577.	578. IT
579. 29.	580. Domestic Waste water Service	581. Index	582. Office phone	583. True		584.	585. IT
			586. Whatsapp Chat	587. True		588.	589. IT
590. 30.	591. Disaster	592. Index	593. Search bar	594. False		595. Not working	596. FT
			597. Menu options	598. True		599.	600. FT
		601. Report incident	the 602. Form	603. True		604.	605. FT
		606. Report status	607. Report details	608. True		609.	610. FT

1. No.	2. Page	3. Section	4. Features	5. Results (True/False)	6.	7. Description	8. Testing Technique
			611. Change report	612. True		613.	614. FT
		615. Disaster map	616. Filter	617. True		618.	619. FT
			620. Data on the map	621. True		622.	623. FT
			624. See report	625. True		626.	627. FT
			628. Rainy weather forecast	629. True		630.	631. FT
632. 31.	633. Eco Green Care	634. Integration Website	to 635. -	636. True		637.	638. IT
639. 32.	640. Activates	641. Index	642. Data	643. True		644.	645. FT
646. 33.	647. Notifications	648. Index	649. Data	650. True		651.	652. FT
653. 34	654. Profile	655. Login	656. Sign in with Google	657. True		658.	659. IT
			660. Account Registration	661. True		662.	663. FT
		664. Edit Avatar	665. Customize	666. True		667.	668. FT
		669. Edit Profile	670. Form	671. True		672.	673. FT
		674. Settings	675. Change password	676. True		677.	678. FT
		679. Terms and Conditions	680. Data	681. True		682.	683. FT
		684. Privacy Policy	685. Data	686. True		687.	688. FT
		689. Help	690. Data	691. True		692. Incomplete data	693. FT
		694. Feedback	695. Submit rating	696. True		697.	698. FT
		699. Exit	700. Logout	701. True		702.	703. FT

The results of the testing are outlined in detail in Table 1. This table includes several key attributes that provide a comprehensive overview of the testing outcomes:

- Page Being Tested: Indicates the specific page of the "Malang Mbois" application under evaluation.
- Section Being Tested: Specifies the individual section within each page that has undergone testing.
- Features in that Section: Lists the specific features present in each section that were assessed for functionality.
- Test Results: Reports whether each function operates correctly, represented as "true" if the function works and "false" if it does not.
- Description of Issues: Provides a brief explanation of any functionality that fails to operate, noted in cases where the result is "false."
- Type/Testing Technique: Indicates whether the testing technique applied was Functional Testing or Integration Testing.

This structured approach allows for a clear understanding of each feature's performance within the application. The data presented in Table 1 highlights areas of success as well as those requiring improvements, thereby guiding further development and optimization of the application's functionality.

CONCLUSION

Based on the testing of the "Malang Mbois" application using the Black Box Testing method, several significant conclusions can be drawn regarding its performance, functionality, and reliability. The majority of the application's features demonstrate stability and accessibility. However, specific functionalities, such as bookmarks on the news page and the search bar on the CCTV page, were found to be malfunctioning, indicating a need for corrective actions to improve overall user experience. While the application generally performs well, issues with the views section—namely the failure to display real-time data—and the inability to pause the voice reader feature highlight areas where functionality is lacking. These reliability concerns must be addressed to enhance user control over the application.

The application successfully integrates several external services, including Sambat Online, Ngalam 112, and public library functions, which showcases its strength in system integration. However, identified problems, particularly with the report and Si-lzol pages, point to necessary improvements in data management practices and internal integration processes. This study acknowledges the limitations in its scope, including the focus on specific features and the limited duration of testing. Additionally, changes in user behavior over time may affect the application's performance post-testing. Future research should expand upon the current findings by assessing the application's performance under varying conditions and user environments. Additionally, integrating user feedback into testing scenarios could provide deeper insights into usability issues.

In conclusion, the "Malang Mbois" application shows considerable promise in delivering various public services to users. With a testing success rate of 82.35%, the application has established a solid foundation. However, addressing the identified bugs and enhancing the functionality and reliability of various features will be vital to ensuring that the application meets user expectations and serves the community effectively.

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